AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended) A gas flux measuring device, ~~wherein;~~

~~———~~ said gas flux measuring device comprises~~;~~:

at least one light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said light source to two or more portions,

a reference cell enclosing the ~~said~~ measuring object gas of known ~~which~~ concentration ~~is known~~ and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct

current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer, ~~and~~

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer~~;~~, and

~~said gas flux measuring device further comprises~~ a flow velocity measuring means for directly measuring horizontal 2-directional flow velocity components and a vertical flow velocity component of a gas flow in the measuring region and putting out measurement signals thereof into said analyzer~~; and~~,

wherein said analyzer carries out an analysis based on the eddy correlation method using the signals inputted from said flow velocity measuring means and, by calculation using an analysis result

thereof, obtains a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 2 (Currently Amended) A gas flux measuring device, ~~wherein;~~

~~———~~ said gas flux measuring device comprises~~;~~:

at least one first light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said first light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said first light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said first light source to two or more portions,

a reference cell enclosing the ~~said~~ measuring object gas of known ~~which~~ concentration ~~is known~~ and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer, ~~and~~

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer~~;~~, and

~~said gas flux measuring device further comprises~~ a second light source radiating a laser beam to the measuring region and a third light receiver receiving the laser beam radiated from said second light source and transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof into said analyzer; ~~and~~

wherein said analyzer obtains, based on the signal inputted from said third light receiver, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to determine ~~grasp~~ a turbulence state of the measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 3 (Currently Amended) A gas flux measuring device, ~~wherein;~~

~~———~~ said gas flux measuring device comprises~~;~~:

a first light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said first light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said first light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said first light source to two or more portions,

a reference cell enclosing the ~~said~~ measuring object gas of known ~~which~~ concentration ~~is known~~ and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer, ~~and~~

a pressure measuring means measuring a pressure in the measuring region and putting out a

signal corresponding to a measured value thereof into said analyzer~~;~~,

~~said gas flux measuring device further comprises;~~

a second light source oscillating a laser beam of the absorption wavelength natural to the measuring object gas toward the measuring region,

a third light receiver receiving the laser beam oscillated from said second light source and transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof, and

a third direct current component detector removing an alternating current component as a modulation signal out of the signal received from said third light receiver and putting out a direct current component of the received light strength into said analyzer; ~~and~~

wherein said analyzer obtains, based on the signal inputted from said third direct current component detector, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to grasp a turbulence state of the measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 4 (Currently Amended) A gas flux measuring device, wherein~~;~~

~~_~~said gas flux measuring device comprises~~;~~:

a single light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said light source to two or more portions,

a reference cell enclosing the ~~said~~ measuring object gas of known ~~which~~ concentration ~~is known~~ and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer, ~~and~~

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer~~;~~,

~~said gas flux measuring device further comprises;~~

a polarization plane rotating device having said ~~the~~ optical system distributing the laser beam oscillated from said single light source to two or more portions and rotating a polarization plane of the laser beam of the two ~~one~~ or more portions distributed by said optical system,

a third light receiver receiving the laser beam of which polarization plane is rotated by said polarization plane rotating device and putting out a signal corresponding to a received light strength thereof, and

a third direct current component detector removing an alternating current component as a modulation signal out of the signal received from said third light receiver and putting out a direct current component of the received light strength into said analyzer; ~~and~~

wherein said analyzer obtains, based on the signal inputted from said third direct current component detector, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to determine ~~grasp~~ a turbulence state of the measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 5 (Currently Amended) A gas flux measuring device, ~~wherein;~~

~~———~~ said gas flux measuring device comprises~~;~~:

a single light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said light source to two or more portions,

a reference cell enclosing the ~~said~~ measuring object gas of known ~~which~~ concentration ~~is known~~ and being arranged at such a position that the laser beam distributed by said optical system so as not to be directed to the measuring region is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a ~~second~~ direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second

light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first wavelength modulation demodulator, said ~~second~~ direct current component detector and said second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer, ~~and~~

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer~~;~~,

~~said gas flux measuring device further comprises;~~

a polarization plane rotating device having a Faraday rotator externally controlled and rotating a polarization plane of the laser beam oscillated from said single light source,

a polarization plane modulation controller controlling a rotation angle of said Faraday rotator so as to change over the laser polarization plane between a vertical polarization and a horizontal polarization with a predetermined period,

a first polarization plane demodulator detecting, based on a strength modulation reference signal from said polarization plane modulation controller, a signal synchronized with a polarization plane modulation out of the signal put out from said first light receiver and putting out a signal in proportion to a received light strength of a vertically polarized laser beam transmitted through the

measuring region as a measuring region laser absorption quantity signal into said analyzer,

a second polarization plane demodulator detecting, based on the strength of the modulation reference signal from said polarization plane modulation controller, a signal synchronized with the polarization plane modulation out of the signal put out from said first light receiver and putting out a signal in proportion to a received light strength of a horizontally polarized laser beam transmitted through the measuring region as a measuring region laser absorption quantity signal into said analyzer, and

a third polarization plane demodulator detecting, based on the strength modulation reference signal from said polarization plane modulation controller, a signal synchronized with the polarization plane modulation out of the signal put out from said first light receiver and putting out a signal in proportion to a received light strength of the laser beam transmitted through the measuring region as a concentration measurement signal into said analyzer; ~~and~~

wherein said analyzer obtains, based on the signals inputted from said first, second and third polarization plane demodulators, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to determine ~~grasp~~ a turbulence state of the measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 6 (Original) A gas flux measuring device as claimed in Claim 5, wherein said third polarization plane demodulator is provided downstream of said first wavelength modulation demodulator and a polarization plane modulation frequency thereof is set lower than a wavelength modulation frequency thereof.

Claim 7 (Original) A gas flux measuring device as claimed in Claim 5, wherein said third polarization plane demodulator is provided upstream of said first wavelength modulation demodulator and a polarization plane modulation frequency thereof is set higher than a wavelength

modulation frequency thereof.

Claim 8 (Original) A gas flux measuring device as claimed in Claim 5, further comprising a signal phase converter provided upstream of said first and second polarization plane demodulators for converting a phase of the polarization plane modulation reference signal from said polarization plane modulation controller.

Claim 9 (Canceled)

Claim 10 (Previously Presented) A gas flux measuring device as claimed in Claim 1, wherein said light source and first light receiver are mounted in the same container.

Claim 11 (Original) A gas flux measuring device as claimed in Claim 10, wherein said temperature measuring means and pressure measuring means are also mounted in said same container.

Claim 12 (Currently Amended) A gas flux measuring device as claimed in Claim 10, wherein said flow velocity measuring means is an ultrasonic current meter ~~with a good time-wise responsibility mounted in said same container~~.

Claim 13 (Canceled)

Claim 14 (Previously Presented) A gas flux measuring device as claimed in Claim 2, wherein said light source and first light receiver are mounted in the same container.

Claim 15 (Previously Presented) A gas flux measuring device as claimed in Claim 3, wherein said light source and first light receiver are mounted in the same container.

Claim 16 (Previously Presented) A gas flux measuring device as claimed in Claim 4, wherein

said light source and first light receiver are mounted in the same container.

Claim 17 (Previously Presented) A gas flux measuring device as claimed in Claim 5, wherein said light source and first light receiver are mounted in the same container.

Claim 18 (Previously Presented) A gas flux measuring device as claimed in Claim 14, wherein said temperature measuring means and pressure measuring means are also mounted in said same container.

Claim 19 (Previously Presented) A gas flux measuring device as claimed in Claim 15, wherein said temperature measuring means and pressure measuring means are also mounted in said same container.

Claim 20 (Previously Presented) A gas flux measuring device as claimed in Claim 16, wherein said temperature measuring means and pressure measuring means are also mounted in said same container.

Claim 21 (Previously Presented) A gas flux measuring device as claimed in Claim 17, wherein said temperature measuring means and pressure measuring means are also mounted in said same container.

Claims 22-25 (Canceled)

Claim 26 (New) A gas flux measuring device, wherein said gas flux measuring device comprises:

a first light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said first light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said first light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said first light source to two or more portions,

a reference cell enclosing the measuring object gas of known concentration and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer,

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer,

a second light source oscillating a laser beam of the absorption wavelength natural to the measuring object gas toward the measuring region,

a third light receiver receiving the laser beam oscillated from said second light source and transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof, and

a polarization plane modulation demodulator detecting a signal synchronized with polarization plane modulation out of the signal put out from said first light receiver and putting out a signal in proportion to a received light strength thereof,

wherein said analyzer obtains, based on a signal inputted from said polarization plane modulation demodulator, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to determine a turbulence state of the

measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.

Claim 27 (New) A gas flux measuring device, wherein said gas flux measuring device comprises:

a single light source oscillating a laser beam of an absorption wavelength natural to a measuring object gas toward a measuring region,

a laser output controller controlling an output action of said light source,

a wavelength modulation controller putting out a modulation signal for adding a modulation to an oscillation wavelength of the laser beam oscillated from said light source as well as putting out a reference signal synchronized with the modulation,

a first light receiver receiving the laser beam transmitted through the measuring region and putting out a signal corresponding to a received light strength thereof,

a first direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said first light receiver and putting out a direct current component of the received light strength,

a first wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said first light receiver and putting out a signal in proportion to a concentration of the measuring object gas in the measuring region,

an optical system distributing the laser beam oscillated from said light source to two or more portions,

a reference cell enclosing the measuring object gas of known concentration and being arranged at such a position that the laser beam, distributed by said optical system so as not to be directed to the measuring region, is transmitted through the enclosed gas,

a second light receiver receiving the laser beam transmitted through the enclosed gas in said

reference cell and putting out a signal corresponding to a received light strength thereof,

a second direct current component detector removing an alternating current component as a modulation signal out of the signal put out from said second light receiver and putting out a direct current component of the received light strength,

a second wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an even number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a signal in proportion to the concentration of the enclosed gas in said reference cell,

a third wavelength modulation demodulator detecting, based on the reference signal from said wavelength modulation controller, an odd number order harmonic component of the wavelength modulation signal added to the laser beam out of the signal put out from said second light receiver and putting out a laser wavelength fixing signal as a standard signal for fixing the laser beam wavelength to the absorption wavelength of the measuring object gas,

an analyzer calculating, based on the signals put out from said first direct current component detector, first wavelength modulation demodulator, second direct current component detector and second wavelength modulation demodulator, the gas concentration and a solid particle concentration in the measuring region and putting out a calculation result thereof,

an adder adding the modulation signal from said wavelength modulation controller to the laser wavelength fixing signal from said third wavelength modulation demodulator and putting out an addition signal thereof as an external control signal into said laser output controller,

a temperature measuring means measuring a temperature in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer,

a pressure measuring means measuring a pressure in the measuring region and putting out a signal corresponding to a measured value thereof into said analyzer,

a polarization plane rotating device having the optical system distributing the laser beam oscillated from said single light source to two or more portions and rotating a polarization plane of the laser beam of the one or more portions distributed by said optical system,

a third light receiver receiving the laser beam of which polarization plane is rotated by said polarization plane rotating device and putting out a signal corresponding to a received light strength thereof, and

a polarization plane modulation demodulator detecting a signal synchronized with the polarization plane modulation out of the signal put out from said first light receiver and putting out a signal in proportion to a received light strength thereof;

said analyzer obtains, based on the signal inputted from said polarization plane modulation demodulator, time-wise changes of a laser transmission factor, obtains, based on these time-wise changes of the laser transmission factor, time-wise changes of a gas density, carries out an analysis based on the Monin-Obukhov similarity law in order to determine a turbulence state of the measuring object gas using the time-wise changes of the gas density and obtains, by calculation using an analysis result thereof, a momentum flux in the measuring region, a concentration flux of the measuring object gas and the concentration of the measuring object gas.